CLAIMS

1. A power module for supplying power to loads from power sources, the power module comprising:

a lead frame forming at least a portion of a module housing;

a first set of terminals accessible from an exterior of the lead frame;

a second set of terminals accessible from the exterior of the lead frame;

a positive DC bus received at least partially in the module housing;

a negative DC bus received at least partially in the module housing;

a number of high side switches received in the module housing and selectively electrically coupling a first one of the first set of terminals to respective ones of the second set of terminals;

a number of low side switches received in the module housing and selectively electrically coupling a second one of the first set of terminals to respective ones of the second set of terminals; and

at least one capacitor received in the lead frame and electrically coupled between the positive DC bus and the negative DC bus.

2. The power module of claim 1, further comprising:

at least one substrate coupled to the lead frame, the at least one substrate comprising a high side and a low side;

a number of high side collector plating areas formed on the high side of the at least one substrate; and

a number of low side emitter plating areas formed on the low side of the at least one substrate, where the at least one capacitor is surface mounted to at least one of the high side collector plating areas and the low side emitter plating areas.

3. The power module of claim 1, further comprising:

at least one substrate coupled to the lead frame, the at least one substrate comprising a high side and a low side;

a number of high side collector plating areas formed on the high side of the at least one substrate; and

a number of low side emitter plating areas formed on the low side of the at least one substrate, where a first pole of the at least one capacitor is surface mounted to one of the high side collector plating areas and where a second pole of the at least one capacitor is surface mounted to one of the low side emitter plating areas.

4. The power module of claim 1, further comprising:

at least one substrate coupled to the lead frame, the at least one substrate comprising a high side and a low side;

a number of high side collector plating areas formed on the high side of the at least one substrate; and

a number of low side emitter plating areas formed on the low side of the at least one substrate, where for each of the number of high side collector plating areas at least one capacitor is surface mounted to one of the high side collector plating areas and is surface mounted to a respective one of the low side emitter plating areas.

5. The power module of claim 1 wherein the positive DC bus comprises a positive DC bus bar and the negative DC bus comprises a negative DC bus bar, the negative DC bus bar comprising at least a portion parallel to and spaced from a portion of the positive DC bus bar by a dielectric material.

6. The power module of claim 5, further comprising:

at least one substrate coupled to the lead frame, the at least one substrate comprising a high side and a low side;

a number of high side collector plating areas formed on the high side of the at least one substrate; and

a number of low side emitter plating areas formed on the low side of the at least one substrate, where for each of the number of high side collector plating areas at least one capacitor is surface mounted to one of the high side collector plating areas and is surface mounted to a respective one of the low side emitter plating areas, each of the capacitors passing through at least one of a number of passages formed in the positive and the negative DC bus bars.

7. A power module, comprising:

a lead frame;

a plurality of electrical terminals carried by the lead frame;

a first bus bar coupled to the lead frame;

a second bus bar coupled to the lead frame;

a high side substrate coupled to the lead frame, the high side substrate comprising a number of electrically conductive high side collector areas and a number of electrically conductive high side emitter areas, the high side emitter areas electrically isolated from the high side collector areas;

a low side substrate coupled to the lead frame, the low side substrate comprising a number of electrically conductive low side collector areas and a number of electrically conductive low side emitter areas, the low side emitter areas electrically isolated from the low side collector areas;

a number of high side switches physically coupled to the high side substrate;

a number of low side switches physically coupled to the low side substrate; and

a number of capacitors received in the lead frame, each of the capacitors electrically coupled between one of the high side collector areas and one of the low side emitter areas.

8. The power module of claim 7 wherein each of the capacitors is surface mounted to the respective high side collector area.

9. The power module of claim 7 wherein each of the capacitors is surface mounted to the respective low side emitter area.

10. The power module of claim 7 wherein each of the capacitors is surface mounted to the respective high side collector area and is surface mounted to the respective low side emitter area.

11. The power module of claim 7 wherein at least a portion of the first bus bar and at least a portion of the second bus bar are parallel to one another, and spaced from one another by a dielectric material.

12. The power module of claim 7 wherein the first and the second bus bars comprise a number of passages and the capacitors extend through the passages between the high side substrate and the low side substrate.

13. A method of forming a power module, the method comprising:

providing a lead frame;

coupling a substrate comprising a high side and a low side to the lead frame, the high side comprising a number of high side collector areas and a number of high side emitter areas electrically isolated from the high side collector areas, the low side comprising a number of low side collector areas and a number of low side emitter areas electrically isolated from the low side collector areas;

mounting a number of high side switches to the high side of the substrate;

mounting a number of low side switches to the low side of the substrate;

surface mounting at least one capacitor to one of the low side emitter areas; and

surface mounting the at least one capacitor to one of the high side collector areas.

14. The method of claim 13, further comprising:

for each of the high side switches, surface mounting a collector of the high side switch to one of the high side collector areas; and

for each of the low side switches, surface mounting a collector of the low side switch to one of the low side collector areas.

15. The method of claim 14, further comprising:

for each of the high side switches, wire bonding an emitter of the high side switch to one of the high side emitter areas; and

for each of the low side switches, wire bonding an emitter of the low side switch to one of the low side emitter areas.

16. The method of claim 14, further comprising:

electrically coupling each of the high side emitter areas to a respective one of the low side collector areas.

17. The method of claim 14, further comprising:

providing a first bus structure;

providing a second bus structure;

electrically coupling each of the high side emitter areas to a respective one of the low side collector areas through a number of passages formed in the first and the second bus structures.

18. The method of claim 14, further comprising:

providing a first bus structure;

providing a second bus structure;

providing a number of conductive straps electrically coupling each of the high side emitter areas to a respective one of the low side collector areas through a number of passages formed in the first and the second bus structures.